

Health Care 2020: Reengineering Health Care Delivery to Combat Chronic Disease



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ABSTRACT

Chronic disease has become the great epidemic of our times, responsible for 75% of total health care costs and the majority of deaths in the US. Our current delivery model is poorly constructed to manage chronic disease, as evidenced by low adherence to quality indicators and poor control of treatable conditions. New technologies have emerged that can engage patients and offer additional modalities in the treatment of chronic disease. Modifying our delivery model to include team-based care in concert with patient-centered technologies offers great promise in managing the chronic disease epidemic.

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Chronic disease represents the major driver of illness and health care utilization in the US, and its prevalence in the population is increasing. In 2010, chronic disease was responsible for 7 of every 10 deaths in the US and accounted for over 75% of total health care costs.^{1,2} In just a 5-year span, from 2005 to 2010, the prevalence of chronic disease increased from 46% to 47% of the US population, equivalent to an additional 8 million Americans, and by 2020 it is projected to increase by an additional 16 million, comprising 48% of the population.³ It is noteworthy that over half of these individuals, or approximately 81 million of the US population, will have multiple chronic conditions.⁴ Total cost of health care also has increased steadily over this period, and it is estimated that two-thirds of this escalation is due to the increased prevalence of chronic disease.⁵

As a rule, the proportion of the population diagnosed with chronic conditions will increase with age, and today there are more Americans age 65 years and older than at any

other time in US history.⁶ According to the Census Bureau, there were 40.3 million people age 65 years and older in 2010, up 15.1% from 35 million in 2000 (compared with just a 9.7% increase for the total US population).⁷ By 2020, the US population aged 65 years and older is projected to reach 53 million, with continual increases to 89 million by 2050.⁸ More significantly, the proportion of Americans age 65 and older who report having one or more chronic diseases also rose, from 86.9% in 1998 to 92.2% in 2008.⁶ With the combination of increasing longevity and high rates of obesity and physical inactivity, this trend is expected to continue.^{6,9}

Current projections suggest that by 2020, there will probably be an additional 15 million Americans with hypertension, 12 million with diabetes, 4 million with coronary heart disease, 2 million with stroke, and 2 million with heart failure.^{10,11} According to the World Health Organization and the Centers for Disease Control and Prevention, the root cause of the epidemic in chronic disease is lack of physical activity and poor nutrition, which alone or in combination contributes to obesity and its attendant consequences. In the past 30 years, adult obesity rates in the US have more than doubled, and today, more than two-thirds of American adults are either overweight or obese.¹² Nationally, 38% and 23% of adults, and 36% and 37% of adolescents report consuming fruits and vegetables, respectively, less than one time

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daily.¹³ These risk factors coupled with tobacco use and excess alcohol consumption represent the major lifestyle factors leading to the pandemic of chronic disease in the US and globally.¹⁴

TREATMENT OPTIONS IN CHRONIC DISEASE

Although chronic disease represents the leading cause of death in the US, 40% of all premature death is due to behaviors amenable to change. Maximizing disease outcomes will therefore require the necessary time and expertise needed for a careful assessment and modification of lifestyle factors.¹⁵ In the primary care setting, the median length of a physician visit is <15 minutes, during which a median of 6 topics will be covered, leaving little if any time to formally assess and address the root causes of many chronic diseases, including poor nutrition and physical inactivity.^{16,17} A survey conducted in 2006 revealed, for example, that only 65% of obese patients were provided advice to lose weight by their physicians, and recommendations for physical activity also are rarely addressed.¹⁸ However, when lifestyle modification advice is provided, patient adherence rates regarding weight loss, smoking cessation, or dietary changes are remarkably low, and health care professionals have identified a lack of knowledge, skills, and practical tools as major barriers to successful intervention.¹⁹ Higher success rates for lifestyle modification have been achieved, however, through group programs utilizing nonphysician personnel such as cardiac rehabilitation and exercise training. A contributing factor in the success of these programs is related to the impact of the group dynamic and social support created when patients are exposed to other individuals with the same condition at various stages of lifestyle change.^{20,21} Although these formal structured programs have proven successful in effecting lifestyle change and result in significant improvements in excess weight, smoking cessation, exercise capacity, blood pressure, insulin sensitivity, and lipids, they are unfortunately limited to a small number of patients who present following a cardiac event.

Because assessment and treatment of lifestyle behaviors for chronic disease are infrequent, and when provided, poorly adhered to, physicians are often limited to the sole therapeutic option of medication in order to treat the secondary conditions created from poor lifestyle such as hypertension or diabetes. Although medication is clearly a proven and much needed therapeutic in the management

of many chronic diseases, an unfortunate consequence of its overreliance is that medication-related events have now become a major health concern, particularly among the elderly where chronic disease is most prevalent. On average, individuals aged 65-69 years take 14 prescriptions per year (80-84 years take 18 prescriptions per year), and medication-related problems are now one of the top 5 causes of death in this age group. It is estimated that 28% of hospitalizations among seniors are due to adverse drug reactions, and 32,000 seniors suffer hip fractures each year due to falls caused by medication-related problems.^{22,23} These issues would be best addressed by additionally providing non-pharmacologic alternatives, and the use of emerging technologies recently has demonstrated potential in this regard.¹⁹

Health-focused mobile application software (apps) and wearable devices (wearables) designed for increasing exercise, nutrition education and counseling, smoking cessation, and weight loss programs have demonstrated positive results in effecting lifestyle change in patients presenting with chronic disease.²⁴⁻²⁶ Apps and wearables have the opportunity to provide appropriate-level, tailored education, patient-friendly data visualization tools, exciting gamification strategies, regular feedback with prompts, and other impactful tactics to positively create healthy behaviors. Many apps also encourage patients to engage in social networks where patients have the option of interacting with other individuals seeking similar behavioral change; these social interactions are not trivial, and have been shown to be important in maintaining motivation, a key component of successful behavior change.²⁷⁻²⁹ Apps and wearables have now been successfully implemented in secondary prevention as a virtual form of cardiac rehabilitation and exercise training programs, and have demonstrated promising results.³⁰ Utilization of these technologies has been shown to better engage patients in the care process, leading to improved satisfaction with the health care system, and converts the patient from a passive recipient to an active partner on the health care team.³¹ This is in keeping with the Office of the National Coordinator's 2020 vision for health information technology: *the power of each individual is developed and unleashed to be active in managing their health and partnering in their health care, enabled by information and technology.*³² The opportunities afforded by apps and wearables will significantly expand the physician armamentarium, and provide a cost-effective,

CLINICAL SIGNIFICANCE

- Chronic disease is responsible for 75% of total health care costs and the majority of deaths in the US.
- Existing delivery models are poorly constructed to manage chronic disease, as evidenced by low adherence to quality and control indicators.
- New technologies have emerged that can engage patients and offer additional modalities in treating chronic disease.
- Modifying health care delivery to include team-based care combined with patient-centered technologies offers great promise.

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